Effect of pre-treatment and biofouling of Proton exchange membrane on microbial fuel cell performance

Abstract

Nafion® 117, as the most popular proton exchange membrane, has been studied with regards to the effect of pre-treatment and biofouling for bioelectricity production and wastewater treatment, in dual chamber microbial fuel cells. The obtained results showed that maximum generated power was obtained using pre-treated Nafion® 117, at approximately 100 mW/m2. However, maximum generated power for untreated Nafion ® 117 and biofouled Nafion® 117 were 52.8 mW/m2 and 20.9 mW/m2, respectively. Furthermore, the columbic efficiency of pre-treated Nafion® 117 was 2.32 and 4.15 times higher than untreated and biofouled Nafion® 117, respectively. Obtained results demonstrated that the pre-treatment of the proton exchange membrane is necessary to reach higher powers, and biofouling is a major obstacle for proton exchange membranes in dual chamber MFCs.